GUJARAT TECHNOLOGICAL UNIVERSITY

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A Project Report On

GAS DETECTION

Under Subject Of
Analog Circuit Design
B.E. Semester–IV (EC)

Submitted by
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ABSTRACT

This project entails the design and implementation of a gas detector utilizing a Printed Circuit Board (PCB) and the integrated circuit (IC) 741. The gas detector aims to detect and measure the presence of hazardous gases in an environment. The IC 741 serves as a crucial component in signal amplification and conditioning within the circuit. This project provides an affordable and efficient solution for gas detection applications.

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1. INTRODUCTION

Gas detection is crucial for ensuring safety in various industries such as manufacturing, mining, and chemical processing. Traditional gas detection systems often rely on expensive equipment, making them inaccessible for many users. In this project, we propose a cost-effective gas detector using readily available components and the IC 741. The IC 741, a versatile operational amplifier, plays a central role in amplifying and processing the signals from the gas sensor. The design also incorporates a Printed Circuit Board (PCB) to organize and connect the components efficiently. This project aims to provide a reliable and affordable solution for gas detection needs.

2. COMPONENTS

1. PCB plate
2. Soldering kit
3. Power supply
4. Multimeter
5. Op-Amp 741
6. Buzzer
7. Resistor (100 ohm)
8. Gas sensor (MQ-2)
9. Potentiometer (10k ohm)
10. LED
11. Switch

3. EXPLANATION

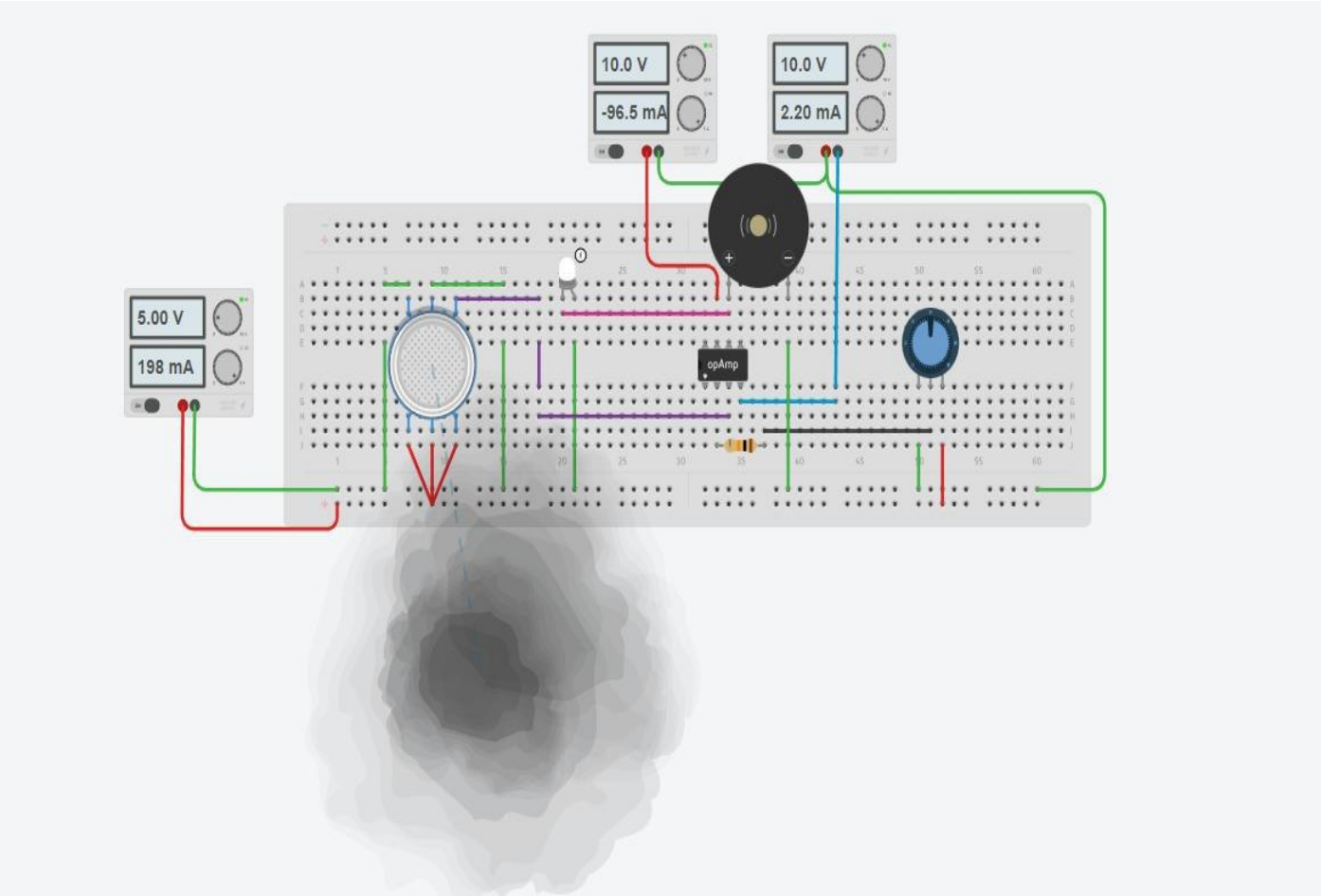
The gas detector circuit consists of a gas sensor, signal conditioning circuitry, and an alarm system. The gas sensor detects the presence of hazardous gases and produces a corresponding electrical signal. This signal is then fed into the IC 741, which amplifies and conditions it for further processing. The PCB facilitates the integration of components and ensures proper connections between them, enhancing the overall reliability and efficiency of the system.

The IC 741 operates in a non-inverting amplifier configuration, providing high gain and stability to the gas sensor signal. Additionally, feedback resistors and capacitors are utilized to adjust the amplification factor and filter out noise from the signal. The output of the IC 741 is then processed by a comparator circuit to trigger an alarm when the gas concentration exceeds a predefined threshold.

The gas detector can be calibrated for specific types of gases by adjusting the sensitivity and threshold levels. The compact and modular design of the PCB allows for easy maintenance and scalability, making it suitable for various industrial and commercial applications.

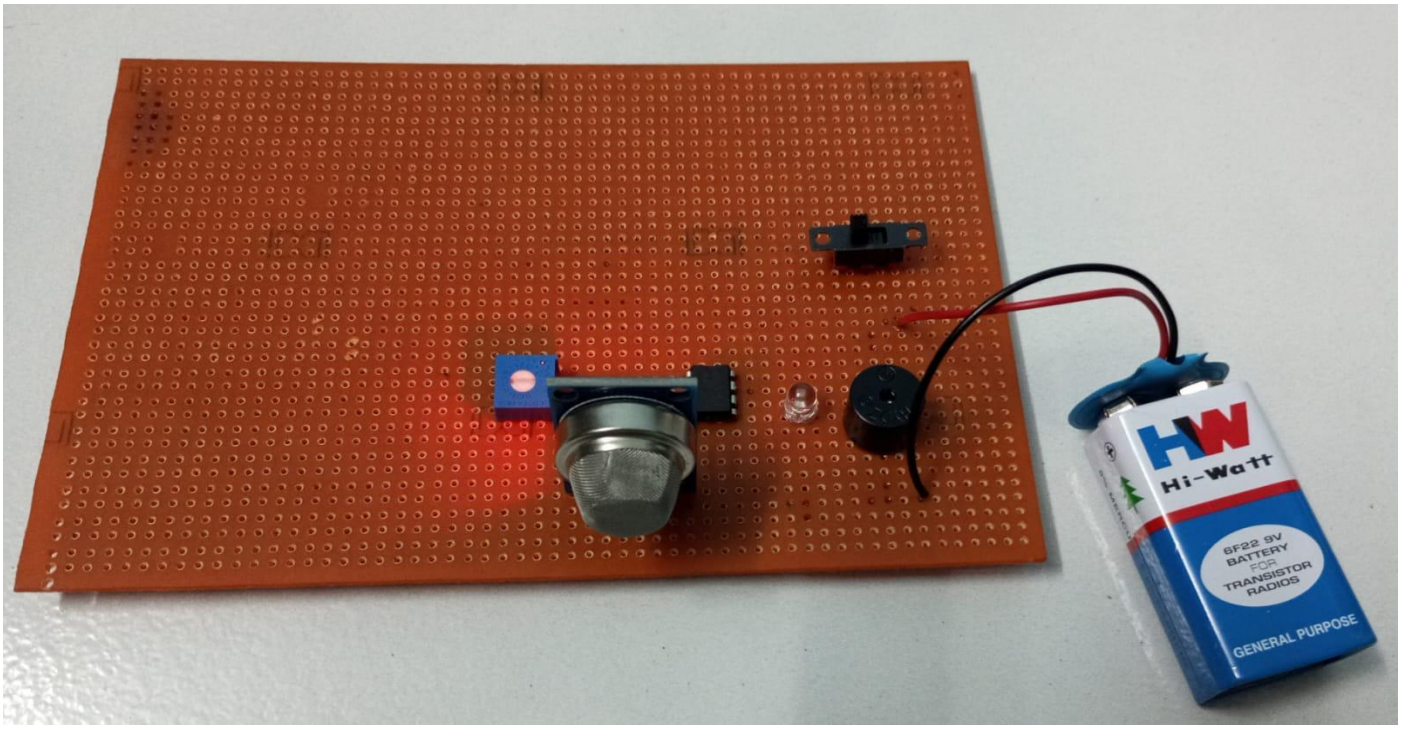
4. CIRCUIT DIAGRAM

Working circuit of gas sensor in tinker cad:



5. PROTOYPE

Physical circuit of gas sensor:



6. CONCLUSION

In conclusion, the gas detector project employing the IC 741 and PCB offers a cost-effective and efficient solution for gas detection requirements. By leveraging the amplification and signal conditioning capabilities of the IC 741, coupled with the organization and connectivity provided by the PCB, the system achieves reliable and accurate gas detection. Future enhancements may involve integrating wireless communication capabilities for remote monitoring and expanding the sensor array for detecting multiple gases simultaneously. Overall, this project demonstrates the feasibility of creating affordable yet robust gas detection systems using commonly available components.